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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/929,883	08/15/2001	Sheng Ma	YOR920010682US1	9298

7590 12/22/2004

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EXAMINER

LE, MIRANDA

ART UNIT	PAPER NUMBER
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2167

DATE MAILED: 12/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/929,883	MA ET AL.	
	Examiner	Art Unit	
	Miranda Le	2167	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 June 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This communication is responsive to the Amendment filed 06/14/2004.
2. Claims 1-34 are pending in this application. Claims 1, 8, 17, 24, 33, 34 are independent claims. No claims have been added, cancelled or amended. This action is made Final.

Drawings

3. The drawings were received on 02/20/2004. These drawings are acceptable.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless:

(e) the invention was described in

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-2, 7-11, 14, 17-18, 23-27, 30, 33, 34 are rejected under 35 U.S.C. 102(e) as being anticipated by Wong et al. (US Patent No. 5,809,499).

Wong anticipated independent claims 1, 19, 25, by the following:

As to claims 1, 17, 33, Wong teaches "A computer based method of mining one or more patterns (i.e. pattern discovery, Fig. 1) in an input data set of items (col. 3, lines

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more sets of items in the input data set as one or more patterns based on whether the one or more sets respectively satisfy a dependency test (statistical significance test T)" at col. 2, line 58 to col. 3, line 18,

"the dependency test being satisfied when each of the items in a set of items is dependent upon each other item with a prescribed significance level" at col. 3, lines 21-67, col. 4, line 1 to col. 5, line 67, col. 11, lines 13-47;

"outputting the one or more identified patterns based on results of the dependency tests" at col. 4, lines 1-4, col. 11, lines 13-67, Fig. 1.

As to claims 8, 24, 34, Wong teaches "A computer-based method of mining one or more patterns in an input data set of items (col. 3, lines 58- 63, col. 4, lines 53-62), the method comprising the steps of: obtaining an input data set of items" at col. 3, lines 58-63 and col. 4, lines 53-62;

"searching the input data set of items to identify one or more sets of items in the input data set as one or more patterns based on whether the one or more sets respectively satisfy a dependency test" at col. 2, line 58 to col. 3, line 18,

"the dependency test being, satisfied when each of the items in a set of items is dependent upon each other item with a prescribed significance level" at col. 3, lines 21-67, col. 4, line 1 to col. 5, line 67, col. 11, lines 34-67;

"outputting the one or more identified patterns based on results of the dependency tests" at col. 4, lines 1-44, col. 11, lines 13-47, Fig. 1.

As to claims 2, 18, Wong teaches “the dependency test employs a normal approximation test when an occurrence count of the items of a set is above a threshold value, and a Poisson approximation test otherwise” at col. 4, lines 20-44, col. 6, lines 43-60.

As to claims 7, 23, Wong teaches “the input data set comprises event data” at col. 5, lines 34-47.

As to claims 9, 25, Wong teaches “prior to the searching step, the step of normalizing the input data set” at col. 7, line 41 to col. 8, line 29.

As to claims 10, 26, Wong teaches “the input data set comprises event data and the normalizing step comprises transforming at least a portion of the event data into event classes such that the event data is non-application-dependent” at col. 8, lines 7-56.

As to claims 11, 27, Wong teaches “the event data transformation step further comprises the step of mapping two or more attributes associated with an event into an event class” at col. 13, line 62 to col. 14, line 38.

As to claims 14, 30, Wong teaches “the outputting step further comprises converting the one or more identified patterns into a human readable format” at col. 4, lines 51-63 and Fig. 1.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 3-5, 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong et al. (US Patent No. 5,809,499), in view of Rangan et al. (US Patent No. 6,434,570).

As to claims 3, 19, Wong does not explicitly teach “a minimum support threshold value associated with the dependency test increases as the frequency of items in a set increases, when a probability that the set is in the input data set is less than a predetermined percentage”. However, Rangan teaches this limitation at col. 3, line 1 to col. 4, line 51.

It would have been obvious to one of ordinary skill in the art of data processing at the time of the invention was made to combine the teachings of the cited references because Rangan’s suggestion of having a minimum support threshold value associated with the dependency test increases as the frequency of items in a set increases, when a probability that the set is in the input data set is less than a predetermined percentage (col.

3, lines 18-23) would have allowed users of Wong's system to decrease the computational requirements, and would thereby further avoid exhaustive search by eliminating impossible pattern candidates.

As to claims 4, 20, Rangan teaches "the predetermined percentage is approximately fifty percent" at col. 5, lines 24-67.

As to claims 5, 21, Wong does not specifically teach "a minimum support threshold value associated with the dependency test decreases as the size of an item set increases". However, Rangan teaches this limitation at col. 3, line 1 to col. 4, line 51.

It would have been obvious to one of ordinary skill in the art of data processing at the time of the invention was made to combine the teachings of the cited references because Rangan's suggestion of having a minimum support threshold value associated with the dependency test decreases as the size of an item set increases (col. 3, lines 18-23) would have allowed users of Wong's system to decrease the computational requirements, and would thereby further avoid exhaustive search by eliminating impossible pattern candidates.

8. Claims 6,12-13, 15-16, 22, 28-29, 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong et al. (US Patent No. 5,809,499), in view of Agrawal et al. (US Patent No. 5,819,266).

As to claims 6, 22, Wong does not expressly teach "the input data set comprises transaction data". However, Agrawal teaches this limitation at col. 5, line 52 to col. 6, line 5.

It would have been obvious to one of ordinary skill in the art of data processing at the time of the invention was made to combine the teachings of the cited references because Agrawal's suggestion of identifying the input data set comprises transaction data would have allowed users of Wong's system to identify large sequences in the database since the Wong's technique with its generality, versatility, efficiency, and flexibility is well suited for automatic pattern discovery, data analysis, trend prediction and forecasting.

As to claims 12, 28, Wong does not specifically teach "the mapping step is performed in accordance with a lookup table". However, Agrawal teaches this limitation at col. 6, line 31 to col. 7, line 31, Tables 1-4.

It would have been obvious to one of ordinary skill in the art of data processing at the time of the invention was made to combine the cited references because Agrawal's suggestion of mapping two or more attributes associated with an event into an event class is performed in accordance with a lookup table would have allowed users of Wong's system to mine the database to identify sequences of time-spaced transactions which are large, and which preferably are also maximal sequences.

As to claims 13, 29, Wong does not teach "the event data is in a tabular form with a first number of columns before the transformation step and in a tabular form with a

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second number of columns after the transformation step, the second number of columns being less than the first number of columns". However, Agrawal teaches this limitation at col. 6, line 33 to col. 7, line 31, Tables 1-4.

It would have been obvious to one of ordinary skill in the art of data processing at the time of the invention was made to combine the cited references because Agrawal's suggestion of identifying the input data set comprises event data wherein the event data is in a tabular form with a first number of columns before the transformation step and in a tabular form with a second number of columns after the transformation step, the second number of columns being less than the first number of columns" would have allowed users of Wong's system to mine the database to identify sequences of time-spaced transactions which are large, and which preferably are also maximal sequences.

As to claims 15, 31, Wong does not teach "the searching step further comprises the step of performing a level-wise scan based on a set length to determine candidate sets of in the input data set that satisfy the dependency test". However, Agrawal teaches this limitation at col. 3, lines 9-49.

Thus, it would have been obvious to one of ordinary skill in the art of data processing at the time of the invention was made to combine the cited references because Agrawal's suggestion of performing a level-wise scan based on a set length to determine candidate sets of in the input data set that satisfy the dependency test" would have allowed users of Wong's system to more easily find sequences of temporally-spaced transactions in a database which repeat with a user-defined degree of regularity, and which guarantee that all sequences of interest are identified.

As to claims 16, 32, Agrawal teaches “the step of pruning candidate sets” at col. 9, line 59 to col. 10, line 17.

Response to Arguments

8. Applicant's arguments filed 03/10/2003 have been fully considered but they are not persuasive.

First, in response to Applicant's arguments that Wong's reference does not teach/suggest claims 1, 8, 17, 24, 33, 34's feature of “a dependency test” which is “satisfied when each of the items in a set of items is dependent upon each other item with a prescribed significant level”, Examiner respectfully disagrees for the following reasons:

The present invention provides techniques for mining fully dependent patterns, and for distinguishing a true pattern from random or noisy patterns [0037] by applying a statistical test (i.e. a dependency test) and an efficient algorithm for discovering all fully dependent patterns in data [0041]. Similarly, Wong teaches a pattern discovery and inference (reasoning) system in which pattern discovery algorithm that is capable of detecting different order patterns in the presence of noise as well as discovering deterministic and probabilistic patterns from imperfect data sets (col. 3, lines 22-25)

Wong teaches “a dependency test” at col. 11, lines 34-52 (i.e. detecting time-dependent patterns). Wong discloses “a dependency test” which is “satisfied when each of the items in a set of items is dependent upon each other item with a prescribed significant level” as “for any two primary events Y_1 and Y_2 in R , construct compound events $[Y_{1t_1}, Y_{2t_2}]$, where $t_1, t_2 \in [O, T]$ (col. 11, lines 39-41). It should be understood that the term “compound events” of the set of events $[Y_{1t_1}, Y_{2t_2}]$ corresponds to “each of

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the items in a set of items is dependent upon each other item” (see col. 11, lines 39-40; lines 59-62); and, “ $t_1, t_2 \in [O, T]$ ” (col. 11, line 42) corresponds to “a prescribed significant level”.

It is also brought to the Applicant’s attention that the Wong not only discloses the time-dependency, but also Wong suggests “a statistical significant test” to detect the significant patterns (col. 9, lines 10-17) as “with a given confidence level, 95% for example, if the absolute value of the residual d_{xj} is greater than the predefined significant level, 1.96 for 95%, then the x_j is considered as a pattern” (col. 8, lines 61-64).

Therefore, the claim language as presented is still read on by the Wong reference at the cited paragraph in the claim rejections.

Second, Applicant’s arguments seem to be suggesting that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, in accordance with the present invention which provides a system to mine d-patterns (true patterns from random or noisy patterns) from a large amount of data including both transaction-like data and/or temporal (time) event data using d-pattern discovery algorithms [0039], Wong similarly is directed to a new pattern discovery system which consists of an algorithm based on a statistical significant test by adjusted residual analysis

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which is capable of detecting different order patterns in the presence of noise, and detecting statistical significant patterns together with the parameters which describe the characteristics of the pattern from a given data set (col. 3, lines 21-25, col. 4, lines 53-56).

Agrawal is directed to a system and method for mining significant sequential patterns of transactions in a large database (col. 1, lines 35-39).

Rangan is directed to the field computation of statistics for population, more specifically, a method for computing the value at a given percentile of a population and the percentile of a given value in the population (Abstract).

It is thus clearly shown that Wong, Agrawal, Rangan references disclose the same field that is computational method for mining or discovering patterns in data sets. It would have been obvious to one ordinarily skilled in the data processing art at the time of the invention was made to combine the teachings of the cited references because they all teach techniques for efficiency detecting a true pattern from random or noisy patterns, and the incorporation of Rangan, Agrawal in the combined system would have enhanced the performance of the Wong's system by easily computing the value at a given percentile (Abstract, Rangan), by quickly finding significant sequential patterns in large databases (col. 1, lines 35-38, Agrawal), thereby, domain knowledge can be easily incorporated into the pattern discovery process by making constraints on the selection of primary event and on the combination of compound event so that we can save time for the whole process (col. 11, lines 53-56, Wong).

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Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

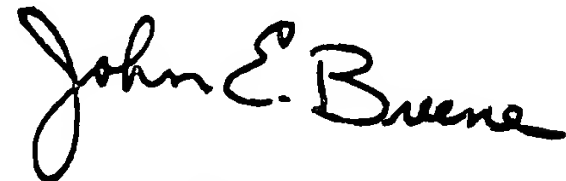
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Miranda Le whose telephone number is (703) 305-3203. The examiner can normally be reached on Monday through Friday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Breene, can be reached on (703) 305-9790. The fax number to this Art Unit is (703) 872-9306. The TC 2100's Customer Service number is (703) 306-5631.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-3900.



Miranda Le
December 10, 2004



JOHN BREENE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100